

Amendments to the Claims

The following listing of claims replaces all prior versions and listings of claims in the application:

1. (Currently Amended) A face ~~recognition and/or verification~~ prototype synthesis method performed by an automated image processing system, the method comprising: providing an image of a person's face to the automated image processing system, said image of the person's face comprising a plurality of pixels, said image of the person's face including pixels corresponding to a first eye and pixels corresponding to a second eye on the person's face; automatically creating a plurality of cropped images based upon said image of the person's face in accordance with a plurality of predetermined facial positions for a center position of the first eye and a plurality of predetermined facial positions for a center position of the second eye, each cropped image within the plurality of cropped images including pixels corresponding to the first eye and pixels corresponding to the second eye, each cropped image within the plurality of cropped images corresponding to a different facial position for at least one of a center position of the first eye and a center position of the second eye with respect to another cropped image within the plurality of cropped images; automatically creating a plurality of face prototype images by applying a set of lighting masks and a set of warping masks to each cropped image within the plurality of cropped images, each face prototype image within the plurality of face prototype images including pixels corresponding to the first eye and pixels corresponding to the second eye, each face prototype image within the plurality of face prototype images representing a possible appearance of the person's face; and storing the plurality of face prototype images

~~registering a persons actual face wherein an image of said actual face is captured and synthesized to create a plurality of face prototypes, said face prototypes representing possible appearances of said actual face under various lighting conditions, varying facial expressions, varying facial orientations, and/or modeling errors, and synthesizing the image of said actual face includes determining alternative facial positions for each eye to create the plurality of face prototypes so as to compensate for possible eye position errors,~~

~~wherein said face prototypes are stored for later analysis and comparison with a captured image to be recognised or verified,~~

~~wherein creating the plurality of cropped images, creating the plurality of face prototype images, and storing the plurality of face prototype images are performed by the automated image processing system~~

~~, and wherein at least one of translational, rotational and scalar transformations is applied to the captured actual face image for normalization thereof.~~

2. (Cancelled)

3. (Currently Amended) The method as claimed in claim 1, ~~wherein comparison of~~ further comprising comparing said plurality of face prototypes images and said captured image ~~uses~~using a face matching algorithm.

4. (Currently Amended) The method as claimed in claim 1, ~~wherein comparison of~~ further comprising comparing said plurality of face prototypes images and said captured image ~~uses~~using face templates or feature vectors.

5. (Currently Amended) The method as claimed in claim 1, ~~wherein synthesizing of said actual face includes normalising said actual face~~ further comprising generating a normalized image of the person's face based on the a spatial relationship between at least two features of the actual face ~~said image of the person's face.~~

6. (Currently Amended) The method as claimed in claim 5, wherein ~~normalising~~ generating the normalized image of the person's face includes ~~rotating said actual face image to bring aligning the first and second eyes of said actual face image of the person's face~~ to a horizontal plane.

7. (Currently Amended) The method as claimed in claim 5, wherein ~~normalising~~ generating the normalized image of the person's face includes scaling said ~~actual face image of the person's face~~ such that the first and second eyes are a fixed distance apart.

8. (Currently Amended) The method as claimed in claim 7, wherein said first and second eyes are fixed at 50 pixels apart.

9. (Currently Amended) The method as claimed in claim 1 wherein the each cropped image within the plurality of cropped images excludes facial areas above the person's eyebrows and below the person's mouth ~~is not synthesized~~.

10. (Currently Amended) ~~The method as claimed in claim 1 wherein determining alternative facial positions for each eye to create the plurality of face prototypes comprises~~ A face prototype synthesis method performed by an automated image processing system, the method comprising:
providing an image of a person's actual face to the automated system, said image of the person's actual face including pixels corresponding to a first eye and pixels corresponding to a second eye within a pair of eyes; and
automatically registering said image of a person's actual face by performing the steps of:

normalizing said image of the person's actual face by applying at least one of translational, rotational, and scalar transformation to said image of the person's actual face;
determining alternative facial positions for each eye so as to compensate for possible eye position modeling errors;
producing cropped images of the synthesized image of the said image of the person's actual face, based upon the determined alternative facial positions for each eye; and
creating a plurality of face prototypes using said cropped images, said face prototypes representing possible appearances of the person's actual face under modeling errors corresponding to errors in a detected position of a pair of eyes on the face, and possible appearances of the person's actual face under various lighting conditions, varying facial expressions, or varying facial orientations.

11. (Currently Amended) The method as claimed in claim 1-10, wherein the plurality of cropped images indicates five alternative positions ~~are determined~~ for each eye.

12. (Currently Amended) The method as claimed in claim 1 wherein ~~synthesizing of said actual face includes~~ applying a set of lighting masks to each cropped image within the plurality of cropped images comprises applying multiple families of lighting masks at least one predefined lighting mask to said actual face image each cropped image within the plurality of cropped images.

13. (Currently Amended) The method as claimed in claim 12, wherein three to 16 predefined lighting masks are ~~used~~ applied to each cropped image within the plurality of cropped images, each predefined lighting mask corresponding to a distinct illumination condition for the person's face.

14. (Currently Amended) The method as claimed in claim 1 wherein ~~synthesizing of said actual face includes applying~~ a set of warping masks to each cropped image within the plurality of cropped images comprises applying multiple families of warping masks at least one predefined warping mask to said actual face image each cropped image within the plurality of cropped images.

15. (Currently Amended) The method as claimed in claim 14, wherein 25 predefined warping masks are ~~used~~ applied to each cropped image within the plurality of cropped images.

16. (Currently Amended) The method as claimed in claim 12, wherein said ~~at least one~~ multiple families of lighting masks includes a photometric transform.

17. (Currently Amended) The method as claimed in claim 14, wherein said ~~at least one~~ multiple families of warping masks includes a geometric transform.

18. (Previously Presented) The method as claimed in claim 17, wherein said geometric transform is estimated using optical flow estimation.

19. (Previously Presented) The method as claimed in claim 16, wherein said photometric transform includes at least one of:

algorithmic function, exponential stretch, vertical shadow, horizontal shadow and differentiating image.

20 – 37. (Canceled)

38. (New) The method of claim 1, wherein automatically creating the plurality of cropped images compensates for facial modeling errors.

39. (New) The method of claim 38, wherein automatically creating the plurality of cropped images compensates for possible eye center position errors arising from eye center position determination imprecision associated with a face location system.

40. (New) The method of claim 1, wherein each cropped image within the plurality of cropped images indicates a distinct probable real position on the person's face for the first eye and a distinct probable real position on the person's face for the second eye.

41. (New) The method of claim 1, wherein each cropped image within the plurality of cropped images is a two dimensional image.

42. (New) The method of claim 5, wherein the first eye and the second eye define a pair of eyes, and wherein each cropped image within the plurality of cropped images indicates a unique facial position for the pair of eyes with respect to the normalized image and each other cropped image within the plurality of cropped images.

43. (New) The method of claim 1, wherein the set of lighting masks is applied identically to each cropped image within the plurality of cropped images.

44. (New) The method of claim 1, wherein the set of morphing masks is applied identically to each cropped image within the plurality of cropped images.